

Emerald in Canada

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Four emerald localities have been described in Canada to date. At the Taylor 2 occurrence, near Dryden, Ontario, beryl occurs in a "zone of mixing" between two limbs of a pegmatite dike consisting of relict K-feldspar crystals in a matrix of albite, biotite, and tourmaline. The beryl occurs as euhedral crystals up to 2.3×1.8 cm in size proximal to the relict feldspar crystals. Most are opaque white to pale green, but approximately 10% of the crystals are emerald green in colour. EMP analyses show up to 0.47 wt.% Cr_2O_3 , 0.05 wt.% V_2O_5 , and 0.50 wt.% FeO.

Crystals of deep-green emerald have been described from Red Mountain near Stewart in British Columbia. These occur as small opaque crystals with numerous fractures in narrow quartz-calcite-pyrite veins cutting volcanoclastic rocks adjacent to a quartz-monzonite intrusion. EMP analyses show 1612 ppm V, 1.04 wt.% FeO, and no detectable Cr.

At the Tsa Da Glisza property in the southern Yukon Territory, emerald mineralization is associated with quartz-tourmaline veins and aplite dikes which intrude mafic metavolcanic rocks. Pale to dark green beryl crystals up to 4 cm in length occur in 12 zones within a ~ 1 km² area. Some of the smaller crystals, and sections of larger crystals, are gem-quality. The Cr in the emerald (average 3208 ppm) is from the schist, which has an average Cr content of 960 ppm. The source of the Be is a two-mica S-type granite pluton with 9.8-13.2 ppm Be which underlies the occurrence.

At the Lened property in the western NWT pale to dark green emerald crystals typically 2 cm \times 3 mm occur in quartz-carbonate veins which extend perpendicularly from a thrust fault and cut a skarn assemblage. EMP analyses of the emeralds show up to 0.5 wt.% V_2O_5 and 0.04 wt.% Cr_2O_3 . The probable source of Be is the Lened stock with up to ~ 8 ppm Be, and the source of the V is the black shale footwall unit, with $>3,000$ ppm V.

Distribution and geochemistry of gem tourmaline-bearing pegmatites in western Maine

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Since the discovery of tourmaline in North America in 1820, Maine has been one of two primary sources of gem-quality tourmaline in the United States. These gemstones are found in granitic pegmatites of the LCT (*Li, Cs, Ta*) affinity believed to have been derived from S-type granites of Devonian to Permian age. The Rumford and Sebago pegmatite groups of the Oxford pegmatite field contain differentiated pegmatite bodies that carry significant gem-quality tourmaline. Gem grade tourmaline typically occurs in pegmatites with marginal to significant Li mineralization (i.e., spodumene, petalite or lepidolite) and is found largely in cavities within cleavelandite-rich intermediate zones or replacement units. Gem tourmaline crystals are typically shades of green, although locally some pink varieties do occur. In the Rumford pegmatite group, only the Newry pegmatite swarm is well-known for green, pink, and occasionally watermelon variety of gemmy tourmaline. By comparison, gem tourmaline is more common in the eastern and northeastern portions of the Sebago pegmatite group, but absent in the western part.

EMPA data for green and pink tourmalines show compositions that are predominantly elbaite, but with a minor rossmanite component. Overall, X-site vacancies range from 0.06-0.48 apfu for elbaite. Na is always greater than Ca in all tourmalines examined and most contain almost no Ca. Most gem tourmaline contain low Mg, moderate to low Fe and Mn, and high F contents. Chemical data for rock forming and accessory minerals in the gem-bearing pegmatites demonstrate moderate to high degrees of fractionation: e.g., K-feldspar [*K/Rb* 19-146]; muscovite [*K/Rb* 10-82]; beryl [*Na/Li* 0.8-6.6]; garnet [*Mn/(Mn+Fe)* 0.14-0.69] and columbite-tantalite [*Ta/(Ta+Nb)* 0.04-0.93]. The level of rare element enrichment observed in the Maine gem pegmatites is consistent with similar pegmatites hosting gem tourmaline found in other parts of the world.